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Facts & Figures

**for the
Chemistry & Materials Science Directorate**

University of California



**Lawrence Livermore
National Laboratory**

Revised March 1997

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I. THE LABORATORY

This *Facts and Figures* document contains a wide range of budgetary, personnel, and other administrative information about the Laboratory and the Chemistry and Materials Science (C&MS) Directorate. An organization as large and complex as Lawrence Livermore National Laboratory (LLNL) is not easily described in a relatively brief document. Interested parties should also review the LLNL Institutional Plan for a more complete overview of the Laboratory.

Appendix A is a series of tables and figures, providing breakdowns of Laboratory costs, staffing levels, and demographics.

In Fiscal Year (FY) 1997, Laboratory operating budgets were \$934M, with an additional \$162.4M for construction, equipment, and general plant projects—a total of \$1,096.3M. The December 1996 staffing level in FY97 was 6,944.4 Full Time Equivalents (FTEs), including full-time, part-time, and indeterminate time employees. During Calendar Year (CY) 1996, the Laboratory offered a voluntary separation incentive program which is expected to reduce the average FY97 FTE level.

The staff profile of LLNL employees in December 1996 showed that 37% were scientific staff, 38% technical and crafts personnel, and 25% administrative and clerical. See Table A-3 for more detailed information regarding scientific staff and degree composition.

The Laboratory is operated according to a matrix system of management, shown schematically in Fig. 1. "Program" in LLNL parlance refers to major categories of activities such as Defense & Nuclear Technologies, Laser, Energy, etc.; the "Program" Directorates are listed horizontally. Each "Program" organization is headed by an Associate Director (AD). Listed vertically are the disciplinary "support" Directorates such as Physics and Space Technology, C&MS, Engineering, and Computation. Each of these is also headed by an Associate Director. About 50% of the Laboratory staff has an administrative home in one of the discipline Directorates and an additional 30% in the service organizations. Most of the discipline Directorate staff are assigned to work on a project in one of the programs; that is, they are matrixed to a program Directorate. Programmatic work assignments for an individual can change from time to time, but the administrative home tends to remain relatively constant.

Within the program Directorates and the supporting Directorates, there is no standardized organizational structure. Each Associate Director (Fig. 2) is expected to organize the directorate to be efficient for the purposes of that organization's mission.

Figure 1. Organizational Matrix at LLNL

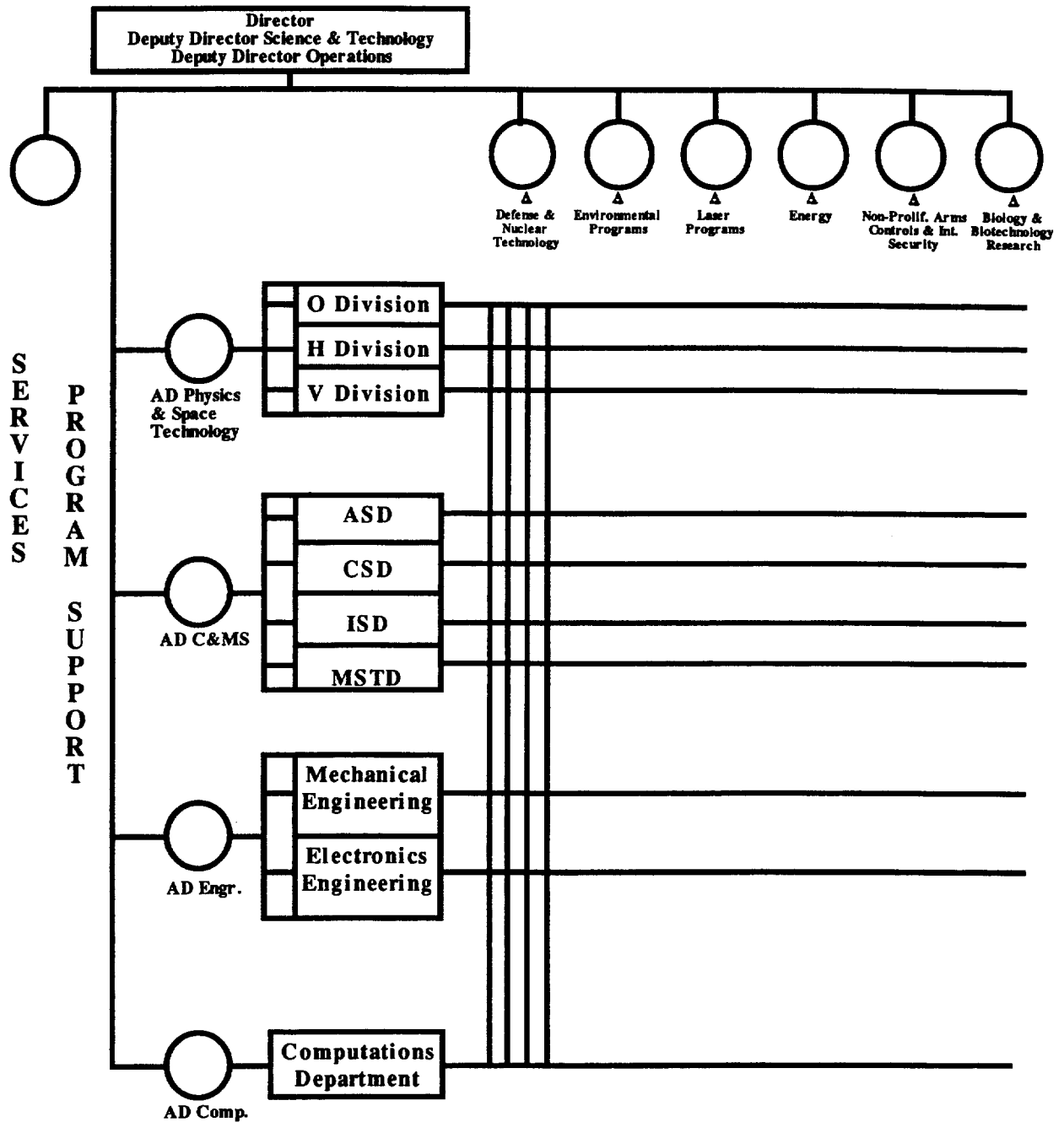
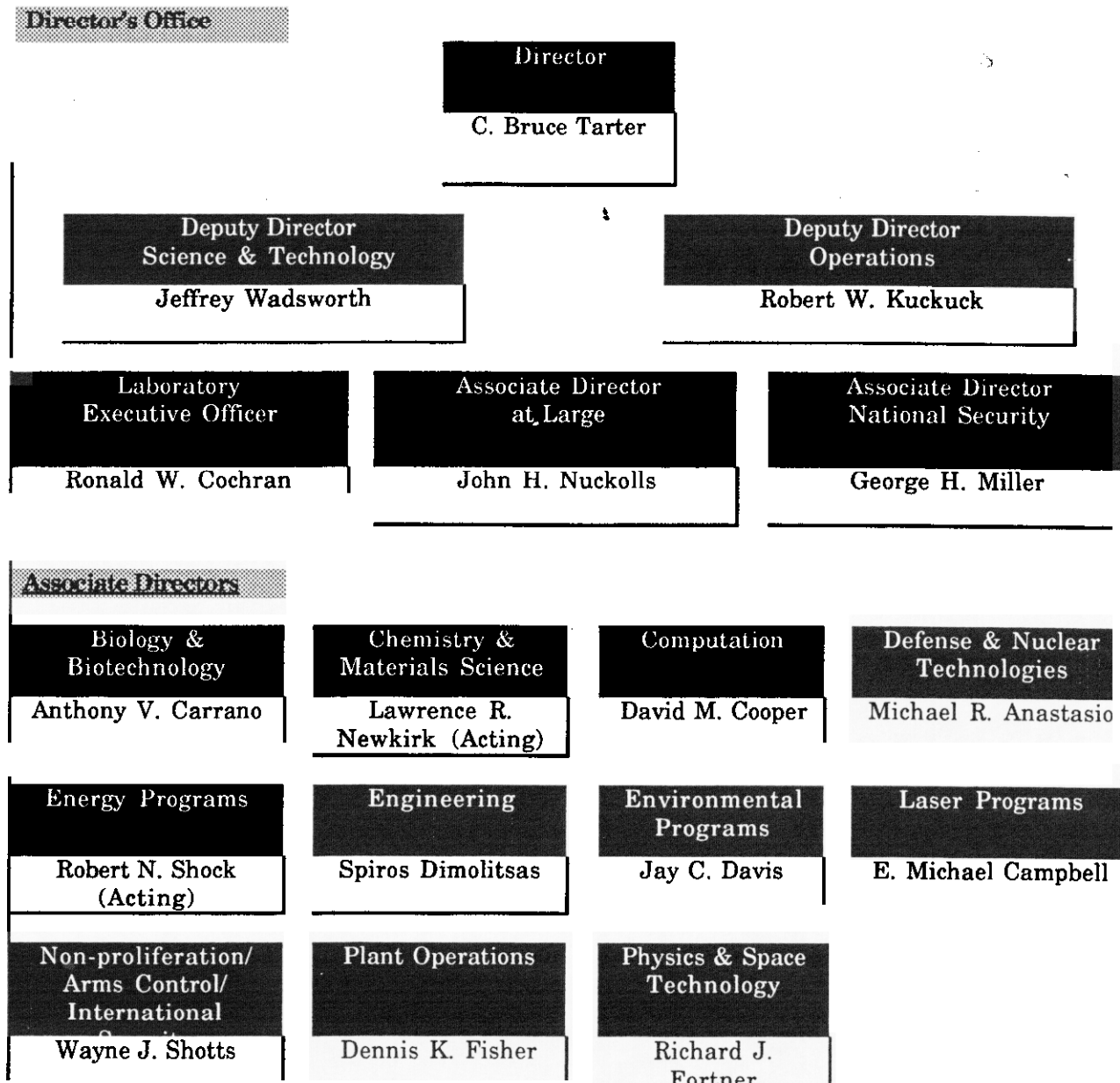


Figure 2. LLNL Organizational Chart



II. CHEMISTRY AND MATERIALS SCIENCE

Mission and Operations

As a disciplinary Directorate, the goal of C&MS is to contribute to the success of key Laboratory Programs. This is accomplished by providing expertise to fulfill existing program objectives and performing research for program evolution. The underpinning foundation is excellence in our disciplinary capabilities and innovation in our scientific ideas.

In practice, the R&D activities of the Directorate can be divided into three broad categories. First, C&MS staff are assigned by the matrix system to work directly in a program. These programmatic assignments typically involve short deadlines and critical time schedules.

A second category is longer term research and development in technologies important to Laboratory programs. The focus and direction of technology-base work are generally determined by programmatic needs.

Finally, the Directorate manages its own research program, mostly long range in outlook and basic in its orientation. The sources of funding, and the policy and procedures for managing the research effort, are described in Section III.

History, Organization, Administration, and Budgets

As a discipline, Chemistry has been identified as a separate organization since the beginning of the Laboratory in 1952 (Fig. 3). At various times the organization has been called Chemistry Group, Chemistry Division, Chemistry Department, Chemistry and Materials Science Department, and since 1985, the Chemistry and Materials Science (C&MS) Directorate. Until 1985, the chief executive was called Department Head and reported to Laboratory management through an Associate Director whose responsibilities typically included other areas such as computing, in addition to chemistry.

In April 1985, Christopher Gatrousis was named Associate Director for C&MS, reporting to the Director of the Laboratory. Dr. Gatrousis retired at the end of October 1993, and Jeffrey Wadsworth was named Associate Director. In January 1996, Dr. Wadsworth was selected as the Deputy Director for Science & Technology and Lawrence Newkirk was named Acting Associate Director of C&MS.

In 1985, the Directorate consisted of ten units called sections or technologies. A reorganization in December 1986, resulted in a structure consisting of three divisions. In May 1993, C&MS was reorganized into four divisions and a program office was established to provide enhanced liaison with

various LLNL programs. In November 1994, the Isotope Sciences Division (formerly the Nuclear Chemistry Division of Test Program) joined C&MS as a fifth division. In February 1995, the C&MS Directorate was again reorganized into four divisions. Figure 4 shows the current C&MS organization. The AD office includes activities that span the Directorate spectrum, such as administration, research, program development, resource management, facility operations, and assurances.

Appendix B is a series of tables and figures that provide C&MS-specific budget, staffing and organization information. Tables B-1 and B-2 in Appendix B show staffing levels by division, disciplines represented, degrees, and other personnel characteristics. In a directorate of 379 employees (career, term, and post doc), 65% are scientists and engineers, 26% technicians, and 9% administrative and clerical. Of the scientists and engineers 53% are chemists, 17% physicists, 9% metallurgists, and 21% engineers. Approximately 74% of the scientists and engineers hold Ph.D.s. Table B-3 summarizes the turnover in C&MS personnel in FY96 and Table B-4 illustrates how it is funded.

Figure 3. C&MS History

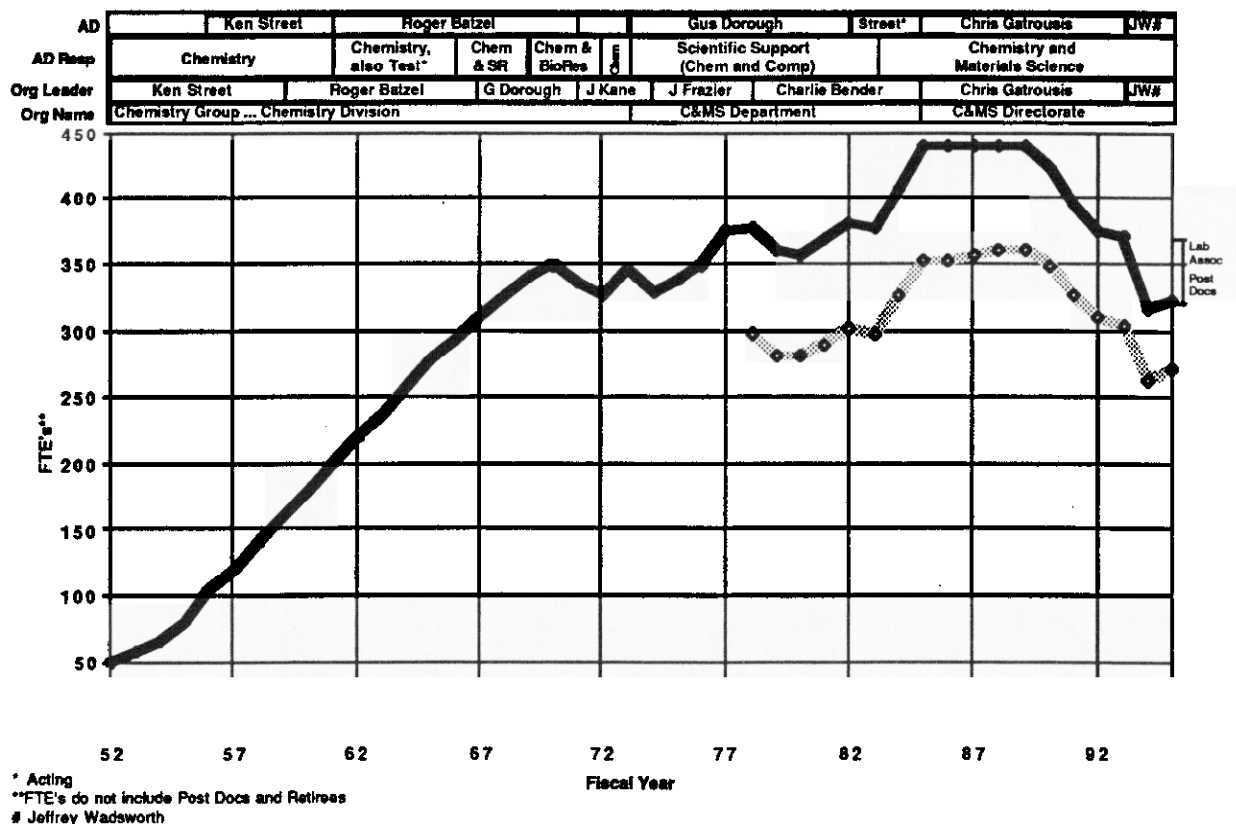
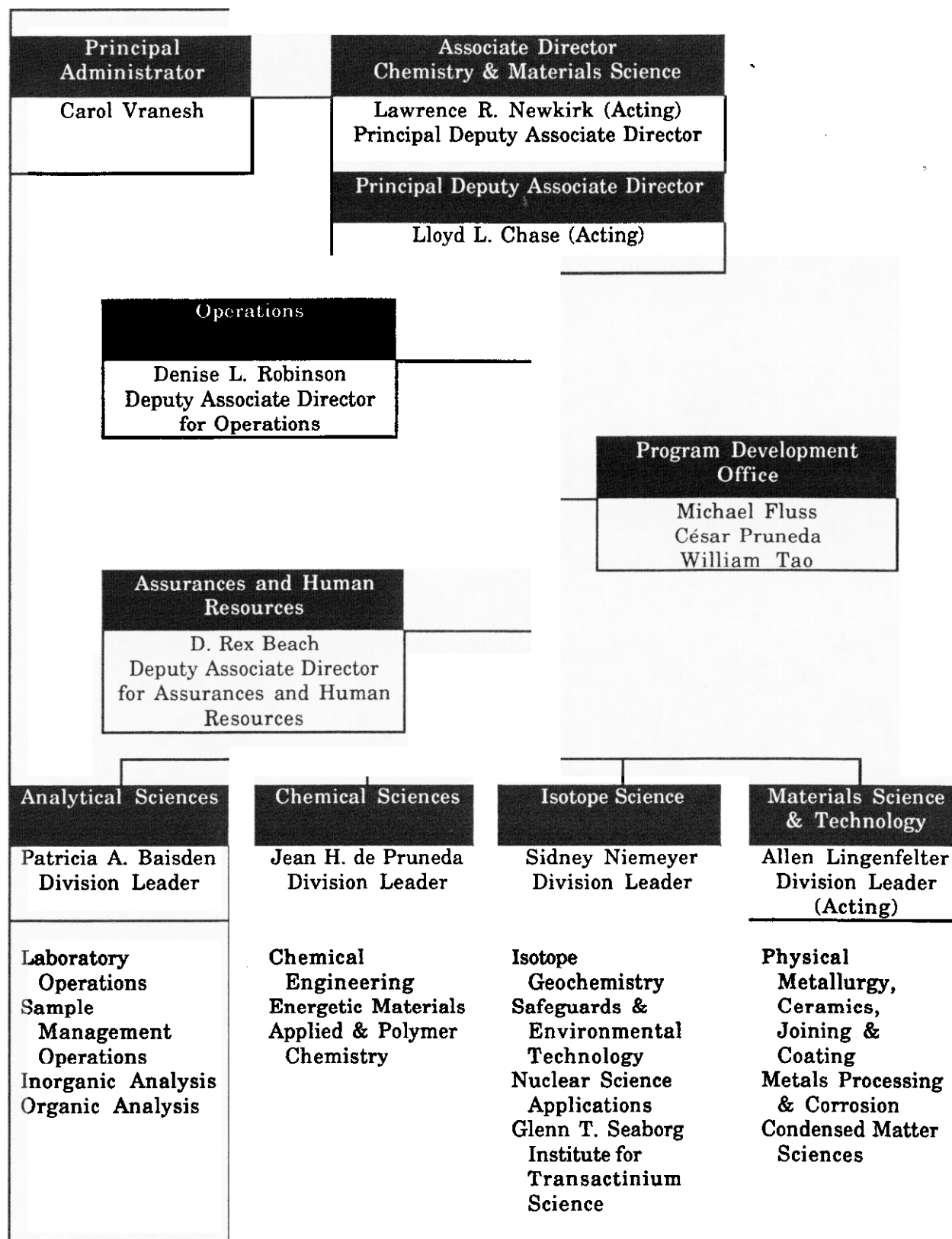


Figure 4. Organizational Structure of the C&MS Directorate



Figures B-3 through B-7 in Appendix B are organization charts for two of the Deputy Associate Directors and four divisions: Analytical Sciences, Chemical Sciences, Isotope Sciences, and Materials Science and Technology. Names of sub-units within the divisions indicate the kinds of activities managed by each division.

The Directorate primarily provides discipline personnel for support to all the programs of the Laboratory according to the matrix system. Support for our staff that has been matrixed to program elements is received from other cost centers as FTE allocations rather than dollars. In FY97, the Directorate is providing 198 FTEs to the various programs — about 37% are for Defense & Nuclear Technologies, 22% Laser Programs, and 13% NAI. The 198 FTEs correspond to about \$46.5M in costs.

Table B-5 shows how C&MS personnel are supported according to funding sources in FY97. The first two categories listed (Direct Programs and Indirect Activities) constitute the C&MS cost centers; C&MS manages these funds. Category 1 consists of direct programs over which the Directorate has jurisdiction; this involves 70.9 FTEs of C&MS personnel and 22.2 FTEs matrixed in from other organizations for a total budget of \$25.9M. Category 2 consists of indirect activities involved in operating the Directorate and includes 55.4 FTEs of C&MS personnel and 44.2 FTEs matrixed in from other organizations, for a total budget of \$17.5M. The sum for the C&MS managed cost centers is 192.7 FTEs and \$43.4M. Thus, the total operating cost of the Directorate in FY97 is about \$89.9M. Capital equipment is budgeted separately, shown in Table B-6.

Facilities

The Directorate is responsible for a number of facilities at the Livermore Main Site (S200) as marked on the site map (Fig. 5) and at the S300 Explosives Testing Site totaling 381K gross square feet. At S200 there are the Materials Research and Development Facility (B235), the Chemistry Building (B222), a refractory materials facility (B241), a radio analytical facility (B151), as well as several trailers and smaller buildings. Total S200 area is about 326,000 gross square feet. Buildings 235 and 222 are within the limited area of the Laboratory. Building 241, buildings 151/154, and related trailers are outside the limited area.

Effective October 1, 1996 the S300 Engineering Process Area facilities (36K gross sq. ft.) were consolidated with the Chemistry Process Area (19K gross sq. ft.). This consolidation represents the S300 high explosives manufacturing facilities totaling 55K gross sq. ft. managed by C&MS.

C&MS is continuing the implementation of a four-year strategic space consolidation project at the S200 which began in FY95 (Chart 1). The project's strategic objective is to implement a consolidation plan for the use of C&MS facilities that meets the following criteria:

- Meets Directorate strategic technical space requirements
- Enhances organizational and functional alignments
- Improves the quality of available facilities

- Optimizes space utilization
- Reduces annual facility operating costs
- Consolidates activities
- Addresses the scheduled move to B132N (a new wet chemistry facility) and the shutdown of B222 for future D&D

Figure 5. Chemistry & Materials Science Facilities Consolidation Plan
Not shown: C&MS Facilities at Site 300

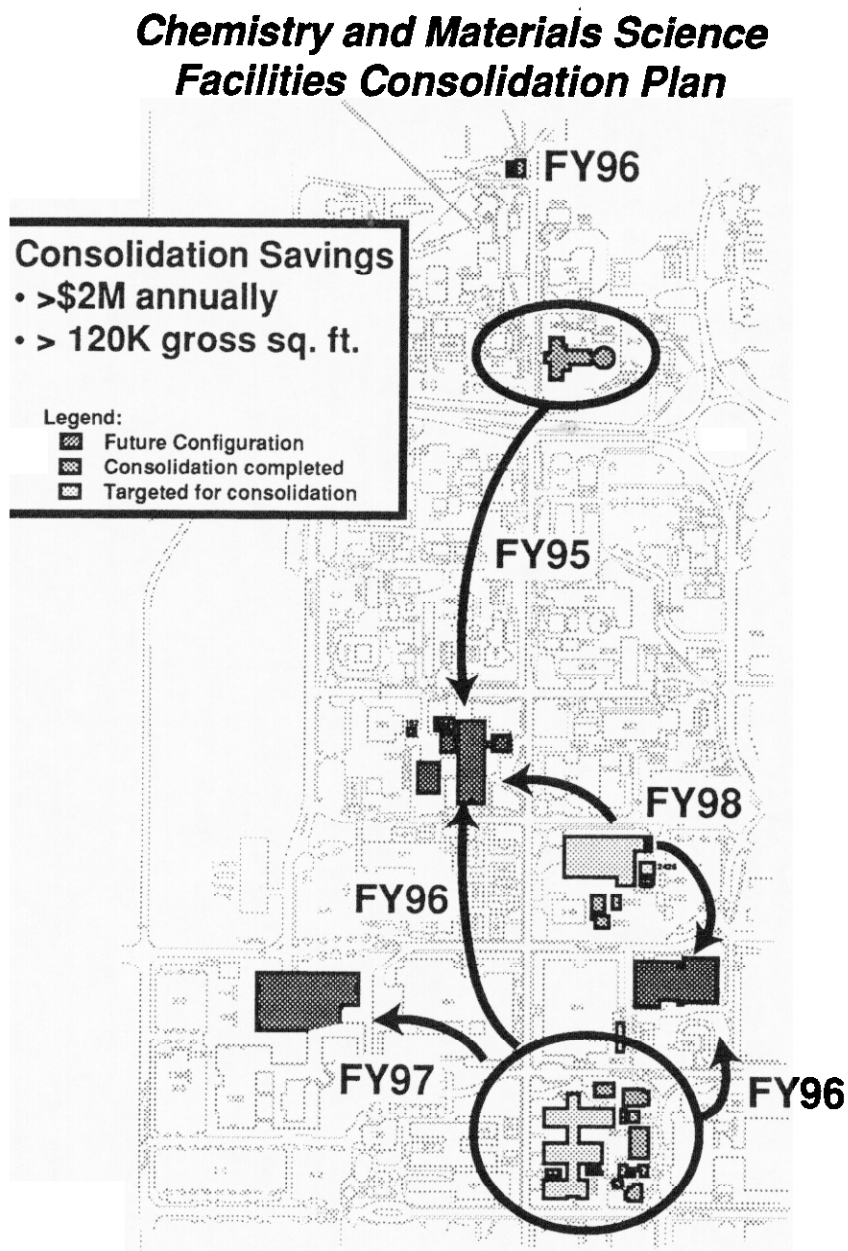


Chart 1. Major Consolidation Tasks

Phase 1 FY95	Phase 2 FY96	Phase 3 FY97	Phase 4 FY98
<ul style="list-style-type: none"> • Vacated & transferred: 223, Dome, 281 • Consolidated: EE and ME • Vacated & Returned to Institution (RTI): 221, 227, 229 	<ul style="list-style-type: none"> • Vacated: 224, 225, 226, 232 • Vacated & transferred: 228, 1925 • Vacated & RTI or demolished: 1926, 2201, 2210, 2226, 2401, 2402, 2403, 2410 • Consolidated: <ul style="list-style-type: none"> - CES into 151 Complex - 151 Counting Facility • Rented: 1526/1527 	<ul style="list-style-type: none"> • Activate 132 • Begin moving ASD & CSD into 132 • Vacate 222 • Start moving 241 residents to 151 complex & 235 • Reroof 151 • Upgrade ventilation system in 151 • Complete 151 retention tank upgrade 	<ul style="list-style-type: none"> • Finish vacating 241 • Finish moving ASD & CSD into 132 • Plan remaining upgrades to core facilities

III. RESEARCH ADMINISTRATION AND FUNDING

Research is considered to be a Directorate-wide activity so that oversight and policy-making are vested in the Associate Director's office. The Principal Deputy Associate Director assumes general responsibility for administering the research effort with guidance from the Associate Director and consultation with Division Leaders. Programs and projects are reviewed internally at least twice a year and externally at longer intervals.

Funding for research and development that is managed in the Directorate comes primarily from Defense and Nuclear Technologies (D&NT), Laboratory Directed Research and Development (LDRD), DOE Office of Basic Energy Sciences (OBES), and Reimbursables/Work for Others (WFO).

Weapons Research & Development

Weapons Research & Development (WR&D) is a major source of discipline research funds to support LLNL Weapons research. The total WR&D program at LLNL is approximately \$240M in FY97 and a portion of these funds are utilized among the supporting Directorates responsible for research advances in the disciplines. The C&MS research component of these funds is \$5,531K in FY97. The overall purpose of this research component is to provide the scientific and technical base that is required in the longer term for the success of the National Security Programs.

The principal criteria for project selection are the quality of the proposed science, the qualifications of the investigators, and the relevance to National Security. Summaries of the research accomplished are contained in annual progress reports of the Directorate.

Laboratory Directed Research and Development

The Department of Energy has issued an Order to provide for a LDRD Program that will allow the use of up to 6% of the Laboratory's operating budget for discretionary research. The LDRD Program at LLNL is divided into separate funding categories:

- Exploratory Research
 - Departmental (ERD)
 - Program (ERP)
 - Institutes (ERI)
 - Supplemental (ERS)
- Laboratory-wide Competition
- Strategic Initiatives

The primary focus of LDRD Exploratory Research in C&MS is the support of the longer range research objectives of the Laboratory's Programs and the contribution of new science and capabilities that influence their direction and development. This can take the form of any of the four specific objectives listed below.

- Fundamental research which provides a basic scientific understanding of a specific issue faced by a program.
- Development of a new scientific capability which is likely to address problems faced by one or more programs, or enable them to move in innovative new directions.
- Research focused on winning external funding which will help support a key C&MS competency important to the Laboratory.
- Short term research (< 1 year) in one of the LDRD/Strategic Initiative target areas to demonstrate proof of principle or concept feasibility, or a research effort which would enable and produce a technical white paper which could then be expanded into a full proposal.

Occasionally, a relatively large C&MS project may qualify for entry into the competition for a Strategic Initiative (innovative research and development projects with significant leverage for future programs).

The ERP category is funded by R&D collections returned to the directorates that generated the funds. Such funds are designated to provide the technical base for developing both existing and future programs for the Laboratory.

C&MS was funded at a total level of \$4.1M in FY97 for all LDRD activities. In general, support for a project is limited to, at most, three consecutive years in this program. Table B-7 is a breakdown of the LDRD FY97 projects and programs.

Other DOE Support

The Directorate coordinates funds obtained from the Office of Basic Energy Sciences, Division of Materials Science. Reporting, oversight, and review are carried out according to guidelines from OBES. This funding level was \$3.5M in FY97. In addition to the support from OBES, the Directorate received another \$2.5M in FY97 from other DOE offices.

Work for Others

In general, research and development performed under the auspices of other federal agencies, such as the Department of Defense, is concentrated on technology base activities. In FY97, \$1.8M came directly to the Directorate.

In addition to work for other Federal agencies, funds are received directly from other DOE sites and from Industry. The decision to seek funding from non-DOE sources is based on Laboratory and DOE guidelines that WFO should not unfavorably impact the Laboratory's DOE mission, that the proposed work enhances or complements Laboratory Programs, that the project in question addresses an important DOE interest, or that the Laboratory possesses unique skills essential to the success of a project. The combined work for non-DOE sources, and other DOE Labs for C&MS, was \$2.8M in FY97.

Glenn T. Seaborg Institute for Transactinium Science

The Laboratory supports a small number of institutes whose purpose is to provide an effective interface with the University of California campuses and other academic institutions in fields where collaborative research is significant for Laboratory programs. In November 1990, the C&MS Associate Director proposed the establishment of an Institute for Transactinium Science (ITS) to be sponsored by LLNL and the Lawrence Berkeley National Laboratory, in collaboration with the University of California, Berkeley. Formal announcement of the Institute, named in honor of Professor Glenn T. Seaborg, was made in February 1991. The Institute is centered at Livermore and is devoted to the study of the transactinium elements with special emphasis on the education and training of the future generation of scientists in heavy-element research.

In pursuit of this goal, the ITS is currently establishing stronger ties to the defense and environmental programs at LLNL, to address their needs for future actinide experts and help with current projects. In 1996, the charter director of the ITS, Darleane C. Hoffman, retired from this post and was succeeded by Louis J. Terminello. The ITS now reports to the Isotope Sciences Division in C&MS.

Table A-1. Laboratory Costs by Major Program

(\$ in millions)	FY 1996 Actual	FY 1997 12/31/96 Plans
<u>LLNL MAJOR PROGRAM</u>		
DP01 - Core Stockpile Stewardship	\$203.4	\$251.5
DP04 - Stockpile Management	27.4	25.4
Technology Transfer	51.2	22.6
Inertial Confinement Fusion	83.7	83.3
National Ignition Facility	16.9	39.7
GA-Fissile Materials Disposition	8.9	13.0
Non-Proliferation & Intelligence	56.0	68.7
Env. Rest. & Waste Mgmt.	57.3	53.9
Other DOE Defense	20.4	24.3
Advanced Isotope Separation	0.6	1.4
Magnetic Fusion	11.0	9.7
NER Supercomputer Center	14.4	0.0
Biomedical & Environmental	25.4	21.7
Basic Energy Science	9.5	8.9
Energy Research	17.2	14.9
Subtotal DOE Direct	603.2	638.8
<u>WFO DOE:</u>		
NIF	0.3	0.0
PANTEX	6.8	2.2
TPX - Princeton	(0.5)	0.0
TRW - Waste Management	14.7	18.0
Other WFD OE	66.2	67.9
Subtotal WFD OE	<u>87.6</u>	<u>88.1</u>
Total DOE Operating	690.8	726.9
<u>Non-DOE:</u>		
CEA-France	11.9	6.6
U-AVLIS (USEC)*	82.7	82.6
Other Non-DOE	99.7	117.9
Subtotal Non-DOE	<u>194.3</u>	<u>207.1</u>
Subtotal Operating	885.1	934.0
DOE Equipment	38.6	34.9
DOE GPP	5.6	5.6
DOE Line Item Construction	56.1	40.3
National Ignition Facility Capital	31.2	81.6
Total Operating & Capital	<u>\$1016.5</u>	<u>\$1096.3</u>

*U-AVLIS (USEC) Before DP Adjustment

Minor variances may be due to rounding

Table A-2. FTE* Plans by LLNL Major Program

	FY 1996 Actual	FY 1997 12/31/96 Actual
<u>DOE DIRECT OPERATING</u>		
DP01 - Core Stockpile Stewardship	839.1	824.7
DP04 - Stockpile Management	74.7	93.4
Technology Transfer	64.4	68.6
Inertial Confinement Fusion	279.6	283.6
National Ignition Facility	39.9	41.1
GA-Fissile Materials Disposition	46.4	46.3
Non-Proliferation & Intelligence	183.8	188.3
Env. Rest. & Waste Mgmt.	216.0	221.2
Other DOE Defense	41.8	33.7
Advanced Isotope Separation	0.1	0.1
Magnetic Fusion	35.5	35.9
NER Supercomputer Center	0.0	0.1
Biomedical & Environmental	87.2	88.9
Basic Energy Science	21.1	22.7
Energy Research	36.0	39.8
Subtotal DOE Direct Operating	1,965.7	1,988.3
<u>WFO DOE:</u>		
NIF	0.0	0.0
Pantex	11.7	13.4
TPX - Princeton	0.0	0.0
TRW - Waste Management	66.1	59.6
Other WFO DOE	192.2	196.1
Subtotal WFO DOE	270.0	269.1
Total DOE	2,235.7	2,257.4
<u>Non-DOE:</u>		
CEA - France	2.2	0.9
U-AVLIS/USEC	328.1	336.4
Other Non-DOE	313.4	315.1
Subtotal Non-DOE	643.8	652.4
Total Direct Sponsor Funded Operating	2,879.5	2,909.8
NIF Capital	176.3	181.6
DOE Construction/Equipment	116.8	115.8
Total Direct Sponsor Funded	3,172.6	3,207.1
<u>Distributed Direct Support</u>		
Lab Directed R&D (LDRD)	237.2	226.4
Distributed Services	918.1	917.9
Organization Facility (OFC)	204.1	209.7
Organization Personnel (OPC)	560.1	533.5
Program Management (PMC)	346.0	338.5
Total Distributed Support	2,265.5	2,226.1
General & Admin	1,474.0	1,511.2
Total Laboratory	<u>6,912.1</u>	<u>6,944.4</u>

Minor variances may be due to rounding

*Full Time Equivalents

Table A-3. LLNL Staff Profile—December 1996

Staff/Education	Ph.D.	ENGR	MS	BS	AA	None	Total
Physicists	602		93	32		2	729
Chemist	118		31	38			187
Engineer/Patent Eng.	254	4	404	222	1	15	900
Mathematician	18		2	1			21
Computer Sci./Math Prog.	39	1	178	197	2	2	419
Biomedical Scientist	16		11	16			43
Biophysicist	1		4		1		6
Environmental Scientist	16		25	23			64
Metallurgist	22	1	6	2		1	32
M.D. (Staff)	6						6
Political Scientist	8		3	2			13
	1100	6	757	533	4	20	2420
Technical and Crafts	1		28	321	724	1379	2453
Administrative and Clerical	32		178	316	136	963	1625
Total Laboratory	1133	6	963	1170	864	2362	6498

Excludes: Summer hires and temporary program participants.

Figure A-1. Ten-Year Laboratory Operating Costs

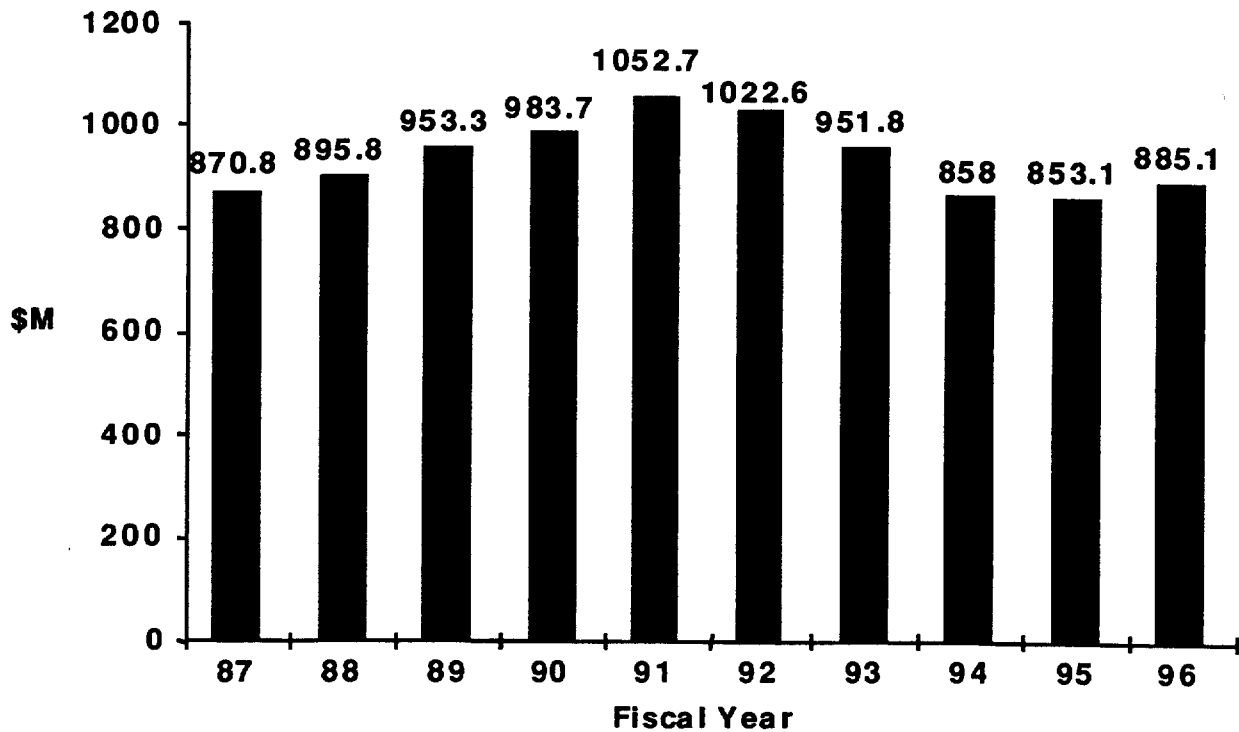
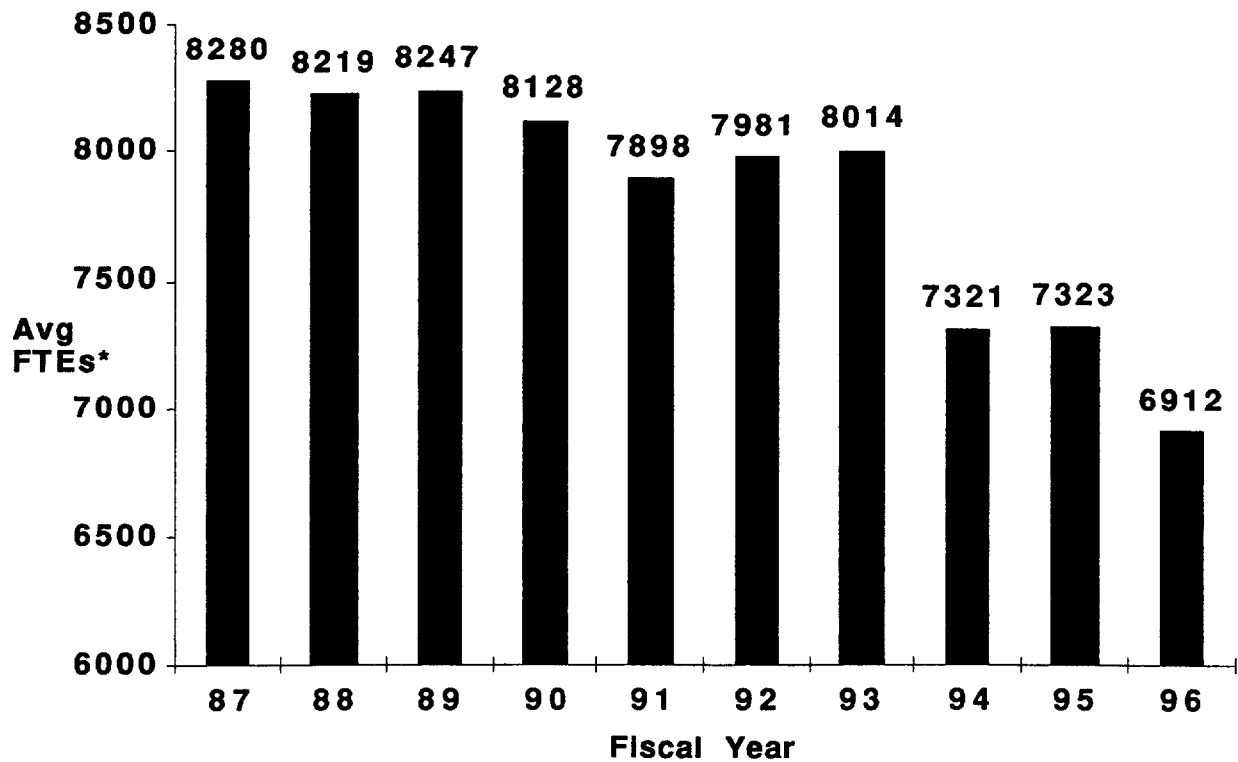


Figure A-2. Ten-Year Laboratory Staff Levels



Includes: Full-time, part-time and indeterminate time employees.

*Full Time Equivalents

Table B-1. C&MS Directorate by Classification

Orig. Unit	Total	Chem	Phys	Met	Engr	Post doc	Tech	Admin./ Clerical
AD Staff (9812)	35	9	4	2	4	-	2	14
ASD (9809)	50	25	-	-	-	2	20	3
CSD (9808)	101	34	4	-	28	3	27	5
MSTD (9811)	121	16	14	19	14	14	36	8
ISD (9810)	72	39	10	-	-	4	13	6
	379	123	32	21	46	23	98	36

Note: Total heads

Table B-2. Degree Status of Scientific, Engineer, Technical, & Administrative/Clerical Staff

Highest Degree	Total	Chem	Phys	Met	Engr	Tech.	Admin/ Clerical
Ph.D.	182	88	37	18	39	-	-
M.S.	28	11	4	3	9	1	-
MBA	3	-	-	-	-	-	3
M.A.	3	1	-	-	1	1	-
B.S.	49	23	-	-	2	21	3
B.A.	23	5	1	-	-	15	2
A.A.	26	-	-	-	-	25	1
A.S.	1	-	-	-	-	1	-
A.B.	2	2	-	-	-	-	-
NONE	62	-	-	-	1	34	27
	379	130	42	21	52	98	36

Note: Total heads

Post docs included in their disciplinary specialties (Chem - 7, Phys - 10, Engr - 6).

Table B-3. Turnover of C&MS Personnel, December 1996

Category	External Hires	Trans In	Terminations	Trans Out	Retire	Net Change
Scientists & Engineers* 14 (Post docs)	(5)	1 (1)	10 (10)	7 (1)	7 (0)	-15 (-5)
Technical	1	1	6	1	4	-9
Admin/Clerical	0	0	3	1	1	-5
Totals	14	3	29	10	12	-34

Note: Total heads

*Includes Post docs

Table B-4. How C&MS is Funded

(\$K)

- Institutional**

G&A	6,299
Capabilities	5,677
Post Docs	622

- Organizational**

Organizational	11,200
Facilities (OFC)	6,000
Personnel (OPC)	4,000
Program (PMC)	1,200

C&MS Cost Centers:

Institutional	6,299
Organizational	11,200
Programmatic	26,299
TOTAL	43,798

- Research, Programs, Services**

Research	13,560
WR&D	5,531
LDRD	4,104
LDRD - CE	100
BES	3,525
BES - CE	300

Programs	6,989
TTIP	240
S&S	1,262
Other Direct	950
Other Direct - CE	37
WFO	4,500

Service Centers	5,750
Materials Char.	650
Nuclear Chemistry	800
CES	4,300

Matrix Personnel	46,460
198 FTE's	46,460

**Table B-5. Distribution of Effort and Operating Funds
for the C&MS Directorate — December 1996**

	FY93	FY94	FY95	FY96	FY97
C&MS Cost Centers (\$K)	27,256	29,444	40,637	49,048	43,798
Category 1:					
Direct Programs	14,827	16,121	22,569	26,868	25,862
DOE-Direct	8,907	11,107	13,620	12,197	11,508
Weapons Research & Development	5,370	4,189	6,000	5,720	5,531
Basic Energy Science (KC02)	2,183	2,752	2,885	3,235	3,525
Technology Transfer	1,174	3,400	1,900	1,068	240
Safeguards and Security			1,135	1,225	1,262
Other DOE-Direct	180	766	1,700	949	950
EDRD	4,575	3,476	4,049	3,504	4,104
Departmental	1,919	1,633	2,260	2,259	1,683
Supplemental					1,718
Strategic Initiative	1,639	877	1,276	1,000	
Institutional Competitive	671	668	227	245	703
Institute - GTS ITS	346	298	286		
Work for Others	1,345	1,006	4,000	5,022	4,500
DOE	496	651	1,900	2,351	1,900
Fed	849	355	1,500	1,795	1,750
Nonfed			600	876	850
Service Centers		532	900	6,145	5,750
Category 2:					
Indirect Activities	11,412	12,583	17,282	21,807	17,499
Support Burden/OPC	5,846	7,100	5,352	5,900	4,000
PMC			870	1,000	1,200
OFC			4,550	7,350	6,000
Overhead/G&A	5,475	5,352	6,385	6,935	5,677
Institute Administration	91	131	125		
Special Employees				622	622
Capital Activities	1,017	740	786	373	437
Inst Capital Equip/Fab	475	196	220		
BES Capital Equip/Fab	542	166	298	307	300
Other Capital Equipment		378	268	66	137
Non-C&MS Cost Centers					
Category 3:					
Support to Programs (FTEs)	307	262	316	326	324
C&MS	34	34	49	47	42
C&MS Distributed	69	59	74	79	55
C&MS Service Centers		3	4	33	29
Defense & Nuclear Technologies	78	64	48	56	74
Energy	24	21	31	19	24
Engineering	8	5	4	3	3
Environmental		10	22	15	10
Lasers	42	25	22	36	43
NAI	17	17	22	20	27
Physics & Space Technology	9	5	10	8	9
Plant Ops	23	17	29	4	4
Various	3	4	3	6	4

**Table B-6. Capital Equipment and Budgets
for the C&MS Directorate in FY97**

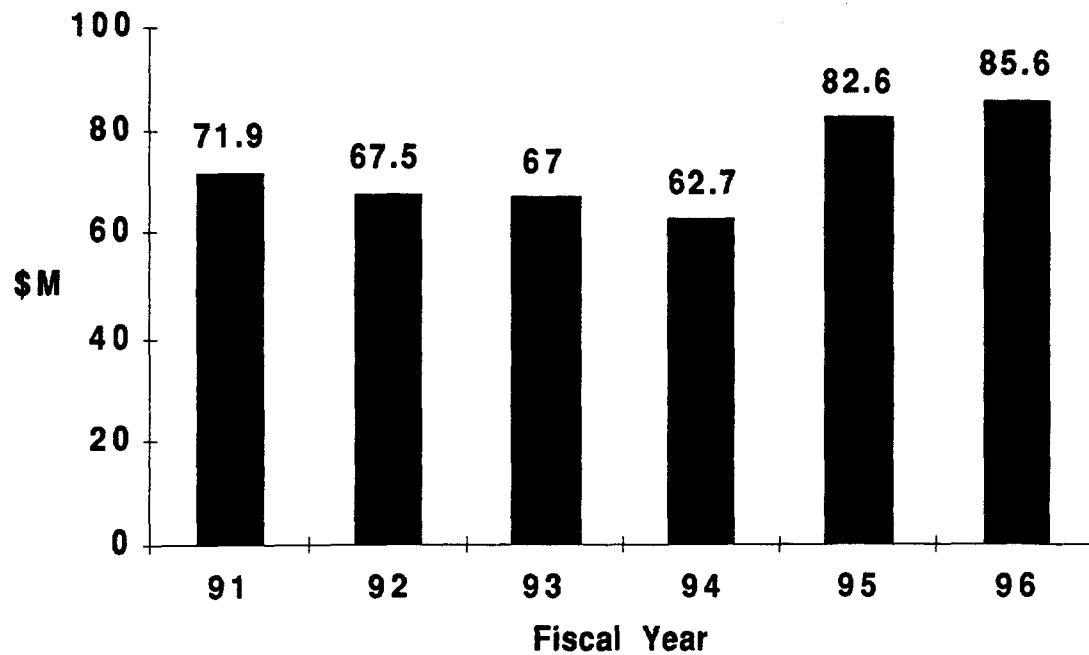
Capital Equipment	\$K FY97
Institutional	0
Technology Transfer	38
BES	300
Safeguards	0
LDRD	99
Other	0
TOTAL	\$437

Table B-7. LDRD FY97 Projects

ERD			
PI	Project	Budget (\$K)	Capital (\$K)
Letts	High Performance Polyimide Coating Technology	260	
Diaz De La Rubia	Surface Morphology Evolution in Silicon During Ion Beam Processing	174	
Yan	Application of Near Field Scanning Optical Microscopy to Optical Materials	134	
Fox	Electroluminescent Polymers	174	
Jankowski	Thin Film Solid-Oxide Fuel Cells	138	32
Hudson	Isotope Measurements for Innovative Groundwater Management	211	
Kammeraad	Innovative Uses for Conventional Radiation Detectors Via Pulse Shape Analysis	255	
Reynolds	Removal of Mercury from Waste Streams	192	
Nieh	Superplasticity in Aluminum Alloys for Automotive Applications	145	
Total ERD		1,683	32
Supplementary			
PI	Project	Budget (\$K)	Capital (\$K)
Cook	Science of NIF Capsule Development	150	
DeYoreo	Optical Damage Mech...Potas,Dihydr. Phos.	85	
Diaz De La Rubia	Theory/Modeling Support - capability support	20	
Baisden	NMR - capability support	34	
Cook	NMR - capability support	24	
Fried	High Performance Energetic Materials	300	
Genin	Contamination Effects on Optical Damage	135	
Jankowski	Coatings - capability support	25	
Kammeraad	Gamma-ray System Development - capability support	50	
Letts	Scanned Probe Microscopy - capability support	15	
Makowiecki	Beryllium Target Development for NIF	150	
Nieh	Metal Forming - capability support	100	
Hulsey	Particle Characterization - capability support	17	
Baisden	Atomic Spec - capability support	50	
Smith	Vadose Zone and Sub-Surface Transport	70	
Cooper	Direct Chemical Oxidation for D&D	50	
Davisson	Tracing Dissolved Organic Matter Transformations	25	
Tao	Technologies for Water Resource Mgmt	50	
King	Exp Validation for Multiscale Modeling	343	67
Newkirk	Undistributed	25	
Total Supplementary		1,718	67
Lab-Wide Competitive			
PI	Project	Budget (\$K)	Capital (\$K)
Balooch	Catheter-based Intervention . . . Coron. Art. Dis.	180	
DeYoreo	Materials Synthesis using Biomineralization	179	
Kinney	Biomechanics of Osteoporosis	180	
Pham	Selective Oxidations of Hydrocarbons	164	
Total Lab-Wide Competitive		703	0
		4,104	99

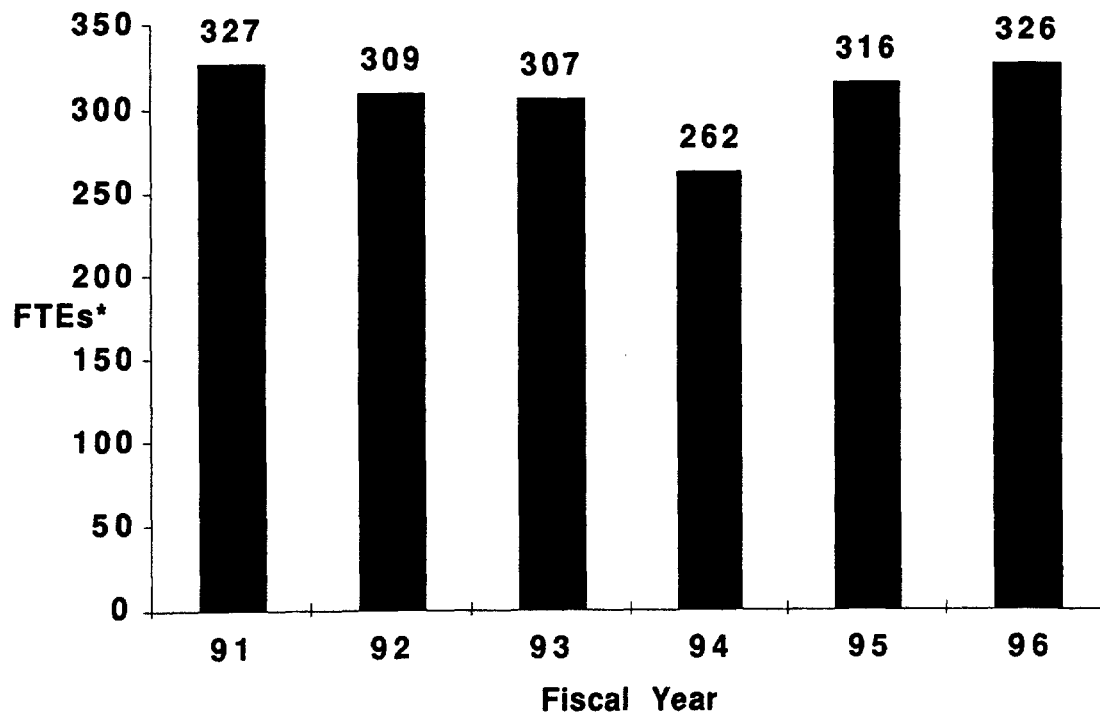
Minor variances may be due to rounding

Figure B-1. C&MS Operating Costs



Note: Nuclear Chemistry Division joined C&MS from Physics in 1994 and was renamed Isotope Science Division.

Figure B-2. C&MS Staffing Levels



*Full Time Equivalents — does not include post docs or terminations/retirees.

Figure B-3

Deputy Associate Director Operations

Denise Robinson, Deputy Associate Director - Operations

BUSINESS MANAGEMENT

A. Moser	Directorate Business Manager
T. Healy	Directorate Resource Manager
M. Cooke	Division Resource Manager
N. Henry	Division Resource Manager
R. Martin	Division Resource Manager
E. Miguel*	Property Administrator
R. Quigley	Acquisitions/Disposals
C. Cate	Technical Release Representative

FACILITY OPERATIONS

J. Carlson	Facility & Information Systems Manager
M. Waterman	Facility Superintendent
A.J. Boegel	S300 Facility & Operations Manager
J. Fischer	Facility Scientist

Deputy Associate Director Assurances and Human Resources

Rex Beach, Deputy Associate Director - Assurances and Human Resources

Pam Poco, Deputy - Assurances

D. Counts*	Safety Assurance Officer
B. Thomson*	Environmental Assurance Officer

Support Staff for the Directorate Office

K. Jautaikis	Administrator
Posted Position	Operations Secretary
B. Wallace	Facilities Secretary
C. Van Arkel	Program Development Secretary
K. Common	Directorate Floater
L. Jones	Property Secretary
S. Woodard	Data Entry
D. Davis	Assurances & Human Resources Secretary

*Matrixed-in staff from other organizations.

Figure B-4

Analytical Sciences Division

Patricia A. Baisden, Division Leader
Ruth A. Hawley-Fedder, Deputy Division Leader

B. Royval, Division Administrator
R. Martin, Resource Manager

Administrative Support

T. Mendoza (T)
D. Montero (SL)
I. Ortega TRR
J. Vargas

Special Assignments

C. Choate (T)	Quality Assurance
N. Butler-Briant	Staff Member- at-Large
D. Chambers	J-Division Liaison
J. Magana	B332 Liaison
R. Torres	Research Coordinator

Laboratory Operations

H. Hall
Section Leader

J. Vargas
Section Secretary

Bajao, D. (T)
Cox, M.
Dixon, J. (T)
Ernst, D.
Harvey, C. (T)
Heinz, I. (T)
Nunes, P.
Pugh, D.
Ruth, A. (T)
Sisson, D. (LA)

Sample Management Operations

P. Epperson
Section Leader

J. Vargas
Section Secretary

Bartholdi, C.
Edwards, C. (T)
Ehrmann, P. (T)
Goins, A.
Letendre, S.
Perry, P.
Silberman, D.

Inorganic Analysis

P. Miller
Section Leader

T. Mendoza
Section Secretary

Butler-Briant, N.
Carman, L.
Coburn, T.
Dickinson, D.
Duewer, T.
King, K.
Magana, J.
Sharp, M.
Weese, R. (T)
Whitbeck, M. (T)
Zaka, R. (T)

Organic Analysis

H. Gregg
Section Leader

T. Mendoza
Section Secretary

Alcaraz, A.
Chambers, D.
Elder, M.
Ertel, J. (T)
Grace, L. (PD)
Haas, J.
Koester, C.
Lindsey, J.
Mew, D. (T)
Prieto, M. (PD)
Sanborn, R. (IN)
Whipple, R.

IN	Indeterminate
LA	Lab Associate
PD	Postdoc
SL	Supplemental Labor
T	Term
TRR	Technical Release Representative

Figure B-5

Chemical Sciences Division

Jean H. de Pruneda, Division Leader
Michael Riley, Deputy Division Leader

Division Office

M. Altenbach, Sec.
M. Schwab, D&NT

Y. Villa, Division Administrator
R. Martin, Resource Manager

Chemical Engineering

C. Thorsness
Section Leader

M. Altenbach
Section Secretary

Aldis, D. (OA)
Balazs, B.
Britten, J.
Camp, D.
Cena, R.
Foster, K.
Hoaglan, C. (T)
Hsu, P. (T)
Jones, D. (T)
Kong, F.
Kozlowski, M.
Mayer, S.
McClelland, M.
Murguia, L.
Parham, T.G. (T)
Shoemaker, D.
Tran, T. (PD)
Upadhye, R.
von Holtz, E.
Wallman, H.
Watkins, B.
Westerberg, K.
Whitman, P. (T)
Zundeleovich, Y.

Energetic Materials

R. Simpson
Section Leader

S. Crowder
J. Maxwell
Section Secretaries

Black, W.
Chandler, J.
Cunningham, (T)
Daniels, L.
Foltz, M.
Forbes, J.
Fried, L.
Garcia, F.
Garza, R.
Green, L. (IN)
Hoffman, M.
Jessop, E.
Kumpf, M.
Kury, J. (IN)
Lauderbach, L.
Lee, C.
Lee, E. (T)
J. Maienschein
Mitchell, A.
Murphy, M.
Nichols, A.
Pagoria, P.
Pederson, K.
Simpson, L.
Souers, C.
Swansiger, R.
Tarver, C.
Urtiew, P. (T)

Applied & Polymer Chemistry

G. Fox
Section Leader

H. Meredith
Section Secretary

Alviso, C.	Reynolds, J.
Brandom, D. (PD)	Sanner, R.
Buckley, S.	Satcher, J.
Calef, D.	Spellman, L.
Chiu, I.	Stevens, C.
Cook, R.	Steward, S.
Coronado, P.	Thomas, N.
Dorege, A.	Tillotson, T.
Fearon, E.	
Golopol, H. (T)	
Haendler, B.	
Hamilton, K. (PD)	
Hrubesh, L.	
Hsiao, M.	
Hulsey, S.	
Land, T. (T)	
Lee, A. (T)	
LeMay, J.	
Letts, S.	
Logoteta, L.	
Miller, F.	
Mones, E.	
Nielsen, J.	
Overturf, G.	
Poco, J.	
Reibold, R.	

IN Indeterminate Retiree
OA On Assignment
PD Postdoc
T Term

Figure B-6

Isotope Sciences Division

Sidney Niemeyer, Division Leader
Jerry Landrum, Deputy Division Leader

C. Power, Division Administrator
B. Bollinger, Office Manager
N. Henry, Resource Manager

Glenn T. Seaborg Institute for Transactinium Science

Louis Terminello, Director
Maureen Tortorelli, Administrator

Romanovski, V. (PD)
Veeck, A. (GS)

Program Leaders

R. Lougheed	Stockpile Stewardship
I. Hutcheon/P. Grant	Nonproliferation/Forensics
W. Ruhter	Safeguards/Waste Characterization
S. Kreek	Environmental Radioactivity
C. Palmer	Waste Repository
S. Niemeyer	Isotope Hydrology

Isotope Geochemistry

P. Russ
Section Leader

R. Browning
Section Secretary

Bazan, J.
Beiriger, J.
Culham, W.
Davisson, L. (T)
Esser, B. (T)
Harris, L.
Henry, N.
Hudson, B.
Hutcheon, I.
Kenneally, J. (S)
Kersting, A. (T)
Phinney, D.
Rose, T. (PD)
Smith, C (LA)
Smith, D.
Velsko, C.
Volpe, A.

Safeguards & Environmental Technology

B. Lanier, *Section Leader*

B. McGurn, *Section Secretary*

Andrews, J.
Bandong, B. (T)
Chukwueke, T.
Dougan, R.
Finnie, L.
Friensehner, A.
Grant, P.
Guthrie, E.
Klunder, G.
Kreek, S. (T)
Nuckolls, R.
Palmer, C.
Prussin, T. (T)
Raschke, K.
Roberts, K. (T)
Ruhter, W.
Ryon, R.
Torretto, P. (T)
Wruck, D.
Zhao, P. (PD)

Nuclear Science Applications

J. Kammeraad
Section Leader

Y. McFadden
Section Secretary

Beckedahl, D.
Clark, D.
Dardenne, Y. (T)
Decman, D.
Henry, G.
Leich, D.
Lougheed, R.
Luke, J. (T)
Manatt, D.
Moody, K.
Namboodiri, N.
Parker, W. (T)
Stoyer, M.
Wang, T.
Wild, J.
Stoyer, N. (PD)

GS Graduate Student
IN Indeterminate
LA Laboratory Associate
PD Postdoc
S Supplemental Laborer
T Term

Figure B-7

Materials Science and Technology Division

Allen C. Lingenfelter, Division Leader (Acting)
Allen C. Lingenfelter, Deputy Division Leader

Administrative Support

S. Christensen
K. Gonzales
K. Coop
N. Poggio

D. Baker, Division Administrator
M. Cooke, Resource Manager

Division Office

J. Atherton
T. Barbee
D. Christensen (TR)
T. G. Nieh

Physical Metallurgy, Ceramics, Joining & Coating

B. Gourdin, *Section Leader*
S. Lyons, *Section Secretary*

Phys. Metallurgy Nanostructure Mtls

Genin, F. (T)	(Barbee, T.)
Nguyen, L.	Alameda, J. (T)
Nguyen, N.	Nguyen, T. (PD)
Schwartz, A.	Olsen, B.
Wall, M.	Wagner, A. (PD)

Joining

Gauthier, M.	<u>Ceramics</u> Wilfinger, K. (GL)
Hoffman, D.	Curtis, P.
Ramos, T.	Hopper, B.
Wagner, L.	Krikorian, O. (TR)
Westfall, B.	Lum, B.
	Shell, T.

Coatings

Makowiecki, D. (GL)	Silveira, J.
Alford, C.	Weinland, S.

High Temp Mtls

(Nieh, T.G.)	<u>Metallography</u> Kershaw, B.
Hsiung, L. (T)	Olson, H.
Wang, J. (PD)	Vallier, B.

Metals Processing & Corrosion

G. Gallegos, *Section Leader*
M. Manapis, *Section Secretary*

Forming & Proc. Electrochemical Proc

Hanafec, J.	Farmer, J. (GL)
Li, E. (PD)	Cooper, J.
Quick, T.	Dodson, K.
Sandoval, P.	Fleming, D.
Sedillo, E.	Foreman, R.
Stratman, M.	Krueger, R.
Summers, L.	Lewis, P.
Torres, S.	Summers, L.

Pu Technology

McAvoy, D.
Burns, R.
Condit, R. (TR)
Ebbinghaus, B.
Gomez, B.
Mason-Reed, V.

Sensor Materials

Glass, B. (GL)
Grant, S. (PD)
Pham, Q. (PD)

Corrosion Tech.

Van Konyenburg, (GL)
McCright, D.
Estill, J.
Gdowski, G. (T)
Halsey, B.

Deposition

Jankowski, A. (GL)
Bettencourt, K.
Huang, J.
Wallace, R.
Barfknecht, A. (LOA)

Condensed Matter Sciences

R. Musket, *Section Leader*
K. Sitzberger, *Section Secretary*

Surface Science Interface Bonding

Balooch, M.	<u>& Joining</u> King, W. (GL)
Bedrossian, P.	Campbell, G.
DelGuidice, G.	Elmer, J.
Dinh, L. (PD)	
Evans, C.	
Goodman, K. (PD)	<u>Theory &</u>
Hamza, A.	<u>Modeling</u>
Siekhaus, W.	Gonis, T. (GL)
Tobin, J.	Caturla, M. (PD)

Materials Char.

DeYoreo, J.	Diaz de la Rubia, T.
Deloach, L.	Huang, H. (PD)
Kinney, J.	Johnson, M. (PD)
Krol, D.	Shu, J. (PD)
Orme, C. (PD)	Turchi, P.
Rozsa, R.	<u>Solid State Chem.</u>
Wang, F.	Terminello, L. (GL)
Yoshiyama, J.	Chaiken, A.
	Ressler, T.
	Van Buuren, T. (PD)
	Wong, J.
	Yan, M. (T)

GL Group Leader
LOA Leave of Absence
PD Postdoc
T Term
TR Term Retiree